

T04D07 – SL Bonding Review for Exam

Name.....

8. What intermolecular forces are present in gaseous hydrogen?
- Hydrogen bonds
 - Covalent bonds
 - Dipole-dipole attractions
 - Van der Waals' forces
9. Which molecule is polar?
- CO₂
 - PF₃
 - CH₄
 - BF₃
10. What are responsible for the high electrical conductivity of metals?
- Delocalized positive ions
 - Delocalized valence electrons
 - Delocalized atoms
 - Delocalized negative ions
11. Which compound contains **both** ionic and covalent bonds?
- MgCl₂
 - HCl
 - H₂CO
 - NH₄Cl
12. Which species has a trigonal planar shape?
- CO₃²⁻
 - SO₃²⁻
 - NF₃
 - PCl₃
13. When C₂H₄, C₂H₂ and C₂H₆ are arranged in order of **increasing** C–C bond length, what is the correct order?
- C₂H₆, C₂H₂, C₂H₄
 - C₂H₄, C₂H₂, C₂H₆
 - C₂H₂, C₂H₄, C₂H₆
 - C₂H₄, C₂H₆, C₂H₂
14. When the species BF₂⁺, BF₃ and BF₄⁻ are arranged in order of **increasing** F–B–F bond angle, what is the correct order?
- BF₃, BF₄⁻, BF₂⁺
 - BF₄⁻, BF₃, BF₂⁺
 - BF₂⁺, BF₄⁻, BF₃
 - BF₂⁺, BF₃, BF₄⁻
15. What is the formula for an ionic compound formed between an element, X, from group 2 and an element, Y, from group 6?
- XY
 - X₂Y
 - XY₂
 - X₂Y₆
16. Which statement is correct about **two** elements whose atoms form a covalent bond with each other?
- The elements are metals.
 - The elements are non-metals.
 - The elements have very low electronegativity values.
 - The elements have very different electronegativity values.

17. In the molecules N_2H_4 , N_2H_2 , and N_2 , the nitrogen atoms are linked by single, double and triple bonds, respectively. When these molecules are arranged in increasing order of the lengths of their nitrogen to nitrogen bonds (shortest bond first) which order is correct?
- A. N_2H_4 , N_2 , N_2H_2
B. N_2H_4 , N_2H_2 , N_2
C. N_2H_2 , N_2 , N_2H_4
D. N_2 , N_2H_2 , N_2H_4

18. What is the shape of the CO_3^{2-} ion and the approximate O–C–O bond angle?
- A. Linear, 180°
B. Trigonal planar, 90°
C. Trigonal planar, 120°
D. Pyramidal, 109°

19. Which combination of $\Delta H_{\text{vaporization}}$ and boiling point is the result of strong intermolecular forces?

	$\Delta H_{\text{vaporization}}$	Boiling Point
A.	large	high
B.	large	low
C.	small	low
D.	small	high

20. What is the formula of the compound formed when aluminum reacts with oxygen?

- A. Al_3O_2
B. Al_2O_3
C. AlO_2
D. AlO_3
21. Which statement is true for compounds containing only covalent bonds?
- A. They are held together by electrostatic forces of attraction between oppositely charged ions.
B. They are made up of metal elements only.
C. They are made up of a metal from the far left of the periodic table and a non-metal from the far right of the periodic table.
D. They are made up of non-metal elements only.
22. How many electrons are used in the carbon-carbon bond in C_2H_2 ?
- A. 4
B. 6
C. 10
D. 12
23. Which compound has the highest boiling point?
- A. $\text{CH}_3\text{CH}_2\text{CH}_3$
B. $\text{CH}_3\text{CH}_2\text{OH}$
C. CH_3OCH_3
D. CH_3CHO
24. What type of solid materials are typically hard, have high melting points and poor electrical conductivities?
- I. Ionic
II. Metallic
III. Covalent-network
- A. I and II only
B. I and III only
C. II and III only
D. I, II and III
25. Diamond, graphite and C_{60} fullerene are three allotropes of carbon.
- (i) Describe the structure of each allotrope.

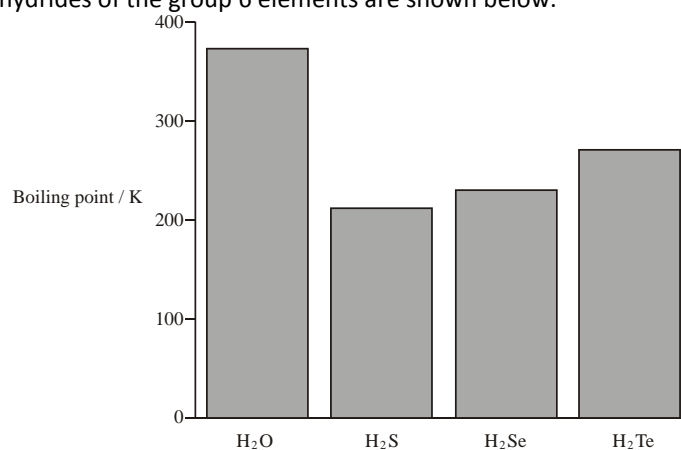
(3)

- (ii) Compare the bonding in diamond and graphite.

(2)

(Total 5 marks)

26. The boiling points of the hydrides of the group 6 elements are shown below.



(i) Explain the trend in boiling points from H₂S to H₂Te.

(2)

(ii) Explain why the boiling point of water is higher than would be expected from the group trend.

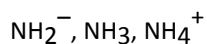
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(Total 4 marks)

27. Draw a Lewis structure of a water molecule, name the shape of the molecule and state and explain why the bond angle is less than the bond angle in a tetrahedral molecule such as methane.

(Total 4 marks)

28. Arrange the following in **decreasing** order of bond angle (largest one first), and explain your reasoning.



(Total 5 marks)

29. (i) Outline the principles of the valence shell electron pair repulsion (VSEPR) theory.

(3)

- (ii) Use the VSEPR theory to deduce the shape of H_3O^+ and C_2H_4 . For each species, draw the Lewis structure, name the shape, and state the value of the bond angle(s).

(6)

- (iii) Predict and explain whether each species is polar.

(2)

- (iv) Using Table 7 of the Data Booklet, predict and explain which of the bonds O-H, O-N or N-H would be most polar.

(2)**(Total 13 marks)**